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Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien

Industrial Tuna Purse-Seine : Fishing gear & related equipment

IOTC ROS SFO TR12.3

Category: IOTC fishery: Tuna Purse-Seine Fishery

[IOTC ROS SFO TR12]



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This module aims to familiarize observers with industrial tuna purse-seine fishing gear and equipment's as they will need to collect information on these in their routine work.

The trainee's performance will be evaluated against the following agreed IOTC ROS competency standards:

- Candidate is familiar with common fishing operational scenarios for the industrial tuna purse-seine fisheries.

The achieving of these standard is demonstrated by candidates' capacity to:

- ✓ **be acquainted with the different components of the tuna purse-seine gear;**



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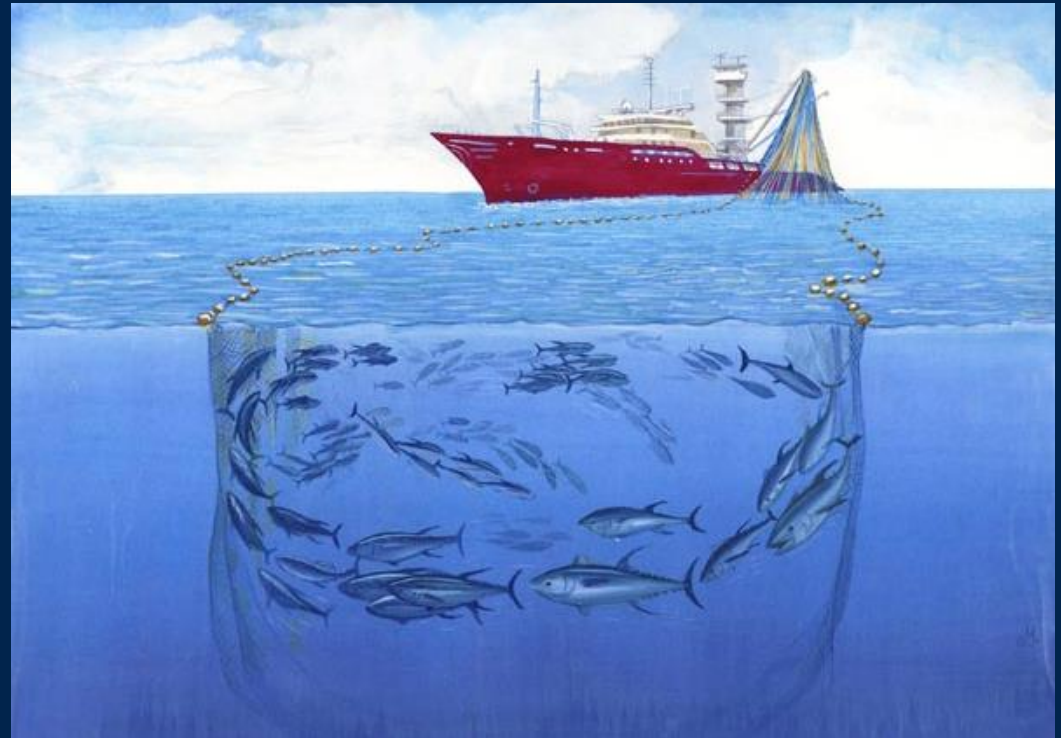


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FISHING GEAR AND RELATED EQUIPMENT

- **Purse seine net**
- **Purse-wire**
- **Lead-line**
- **Float line**
- **Power block**
- **Winch & arrow**
- **Skiff**
- **Brailer**



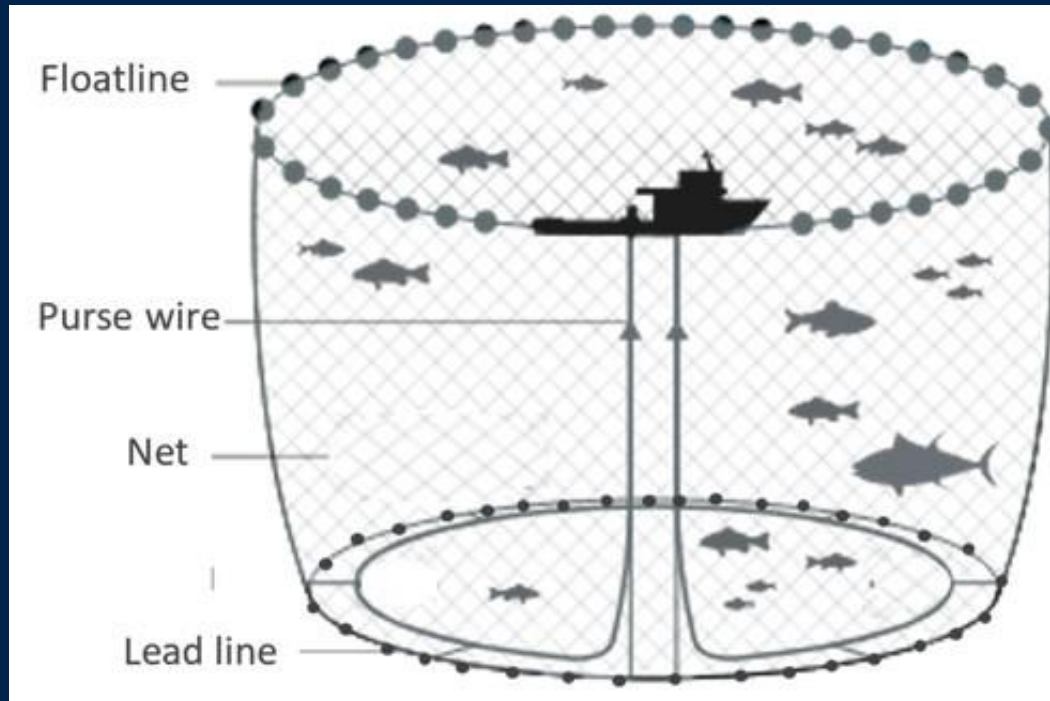
Modern tropical tuna purse seiners fishing in the waters of the Indian Ocean have nets of around 1,500-1,850 m long and with a depth of 250-280 m.



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THE PURSE SEINE FISHING GEAR



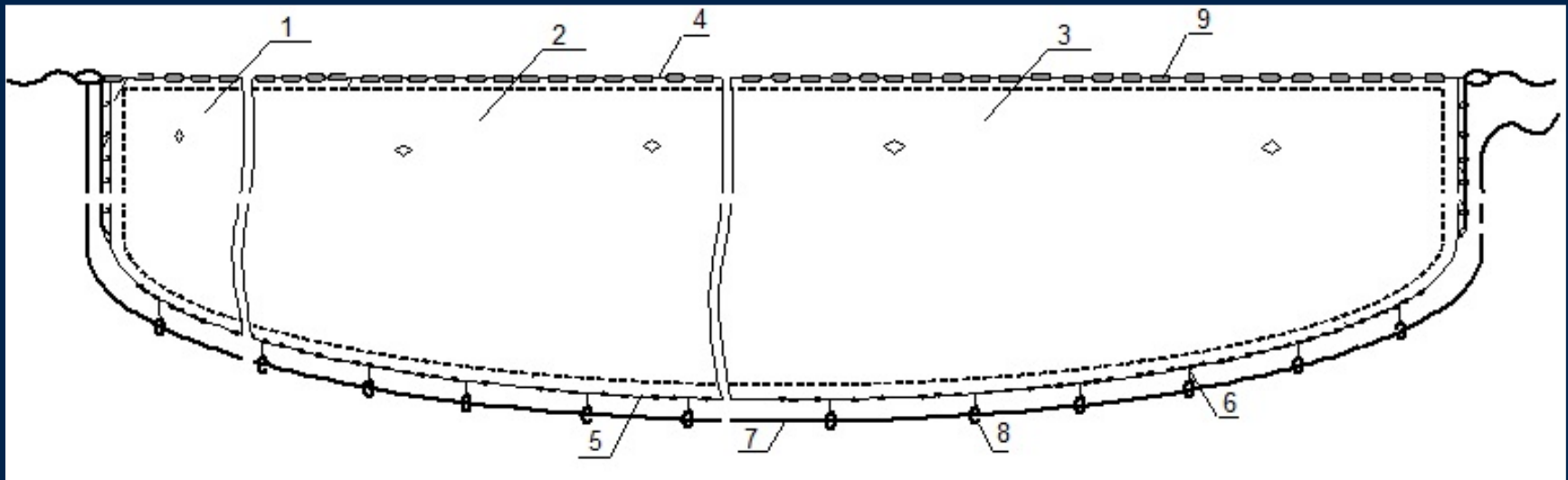
- **Float line** – line equipped with floats to keep the net on the surface and prevent fish escaping over.
- **Purse-wire** - steel wire rope passed through metal rings [purse rings], which, when drawn on, purses the lower portion of the net closed to trap the fish from below.
- **Net** - a series of horizontal and vertical net panels with different sized mesh.
- **Lead Line or footrope**- bottom rope weighted with a heavy chain (8 kg/m).





THE NET

Trapezoid shaped net consisting of a series of horizontal and vertical panels with different sized mesh nets making up different parts of the gear.



1. Bunt (chafer or sack)

4. Float line

7. Pursing wire (purse line)

2. Mid-net (main body or shoulder)

5. Lead line (chain foot rope)

8. Pursing ring (seine ring)

3. Wing

6. Gavel lines (bridle)

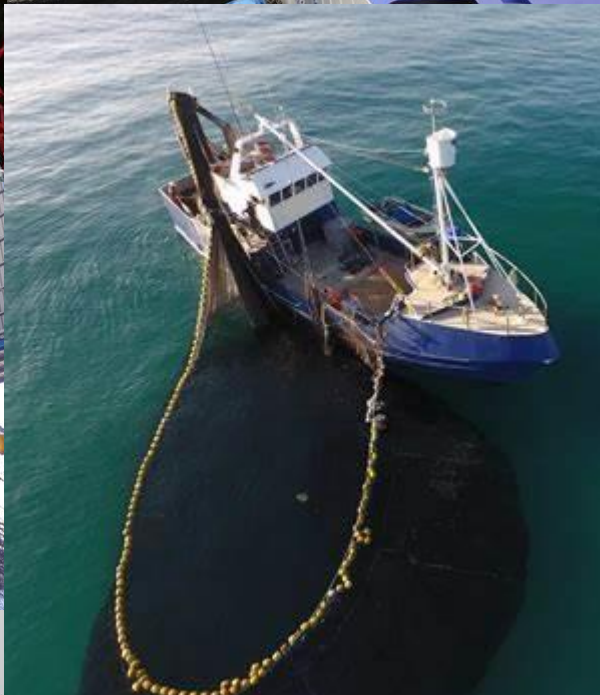
9. Floaters





1. **Bunt:** The region in the purse seine net where the catch is accumulated before brailing. Made up of heavier netting. The bunt is positioned at the end of the wall of the netting to the fore of net main body. **Observers will be required to collect bunt stretched mesh size.**
2. **Main body :** Largest part of the net, that extends from one end to the other end of the net, except for the bunt region. Facilitates surrounding the fish shoal during fishing operations.
3. **Wing:** Panels of thicker mesh that flanks the main body of the net to the stern.
4. **Float line:** Buoyant head rope that keeps the float line on the surface at all times and prevent fish escaping over the top of the net. Consists of cylindrical or spindle shaped plastic or high-density plastic foam floats stung onto a rope to form a float line to which the netting is hung directly.







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5. **Lead line:** Weighted bottom rope crucial to take the net down as fast as possible to encircle the school of fish. Larger tuna purse seiners often use a heavy chain up to 8 kg per meter to weigh down the foot rope.
6. **Gavel lines:** Lines that attach purse rings to the bottom of the net.
7. **Pursing wire:** Steel wire rope housed on the “purse winches”, that is passed through the purse rings. When drawn purses the lower portion of the net closed to trap the fish from below.
8. **Purse rings:** Series of ringbolts attached to the bottom of the net by gavel lines (6), or held by a chain running from strut to strut, through which a steel cable runs, known as the lacing.
9. **Floats:** Cylindrical or spindle shaped plastic or high-density plastic foam floats.



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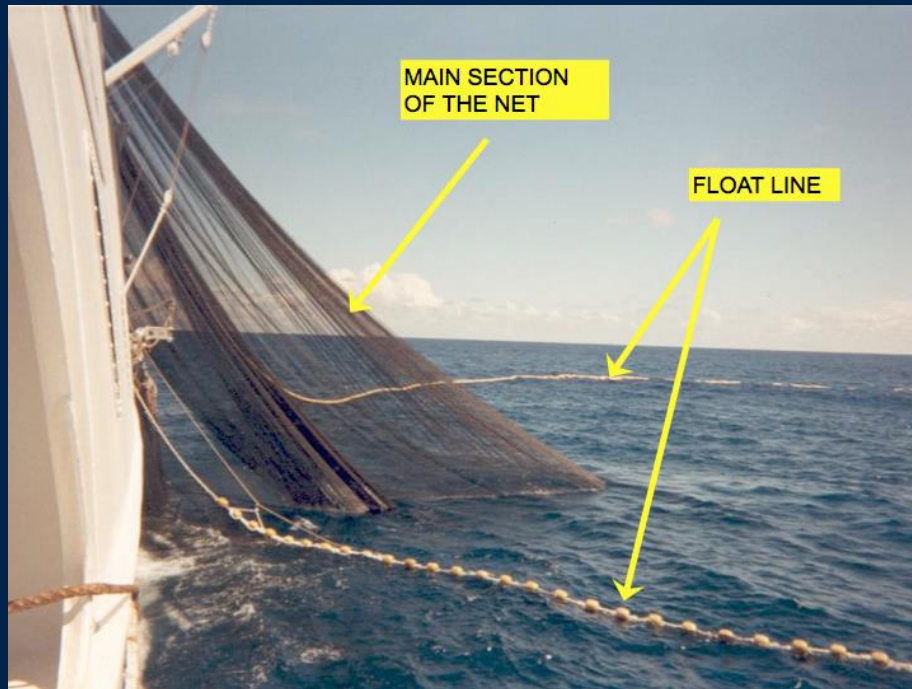
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THE PURSE SEINE FISHING GEAR



The purse seine net (Photo: SPC)



Main net covered by orange tarp, with the bottom of the net (with the associated chains and purse rings/sinkers) visible. (Photo: SPC)



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RELATED EQUIPMENT



Power block- A hydraulic power block attached to the end of an extended boom is used to haul the net back and restack it in at the stern of the vessel ready for the next set.



Purse-seine winch - used to return the main seine line. The cable enters the blocks on the seine arrow which leads them to the winch while pursing and hauling the net.



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Skiff

Powerful boat of 8m with an engine of 600CV, used to assist in setting the net around a school of fish.



Brailer

Large scoop-net (up to 10 t), used to scoop the fish out of the net and empty it into a chute leading down to the lower deck



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Support vessels [also called supply or auxiliary vessels]

- ✓ not equipped with any fishing gear
- ✓ assist one or several purse seiners in the:
 - ✓ building and deployment of FADs
 - ✓ visit of LOGs and FADs
 - ✓ transfer of buoys,
 - ✓ retrieval of FADs and buoys, and
 - ✓ transport of persons and materials and repairing operations



Note: Observers will be required to record if a supply vessel assists purse-seine fishing vessel and record supply vessel(s) name.



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FISH AGGREGATING DEVICES (FADs)

FADs are anchored, drifting, floating, swimming or submerged object or group of objects, of any size, that has or has not been deployed, that is living or non-living, including but not limited to buoys, floats, netting, webbing, plastics, bamboo, logs, whales and whale sharks that fish may associate with.

IOTC glossary of scientific terms, acronyms and abbreviations, 2015



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Note: Observers will be required to record types and configuration of FADs used (e.g. FAD markings, construction materials, design, entanglement incidents).



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FADs can be:

- **NATURAL FLOATING OBJECTS (LOGS)**

- living



- non-living



Natural floating objects include natural logs of plant (branches, trunk, palm leaf, etc.) and of animal origin (carcasses, live whale sharks); and logs resulting from human activity related or not to fishing activities (nets, wreck, ropes, washing machine, oil tank, etc.). These can be equipped or not with a satellite or instrumented buoy.



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Natural floating objects (LOGs)

Very diverse origins

- Vegetable waste: trunk, branches
- Animal waste: carcass of large animals
- Anthropogenic waste: agglomerates of waste, large waste

Note: Man made FADs and LOGs are often attached to radio or satellite buoys, and some have sonar fish detection devices attached which transmit live information back to the fishing vessel



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FADs can also be:

- **ARTIFICIAL [MAN MADE]**

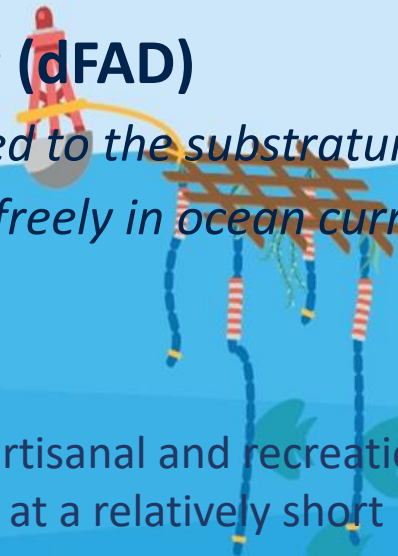
- **anchored (AFAD)**

anchored to the substratum



- **drifting (dFAD)**

*not anchored to the substratum,
left to drift freely in ocean currents*



Anchored FADs are used by a wide range of industrial, artisanal and recreational fisheries, mostly in coastal and archipelagic regions and at a relatively short distance from shore.

Drifting FADs are mainly used by the industrial tuna purse-seine fishery, mostly in oceanic regions (i.e. in the high seas).





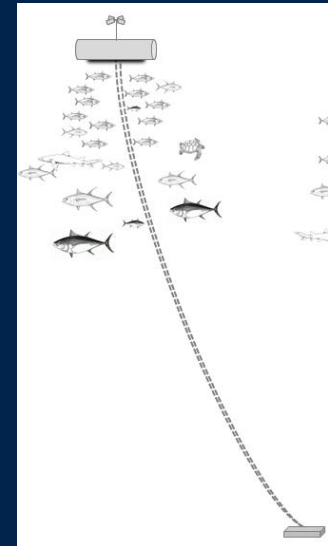
Man Made FADs

Used in a range of industrial, artisanal and recreational fisheries, this fishing practice is most widespread – and most developed – in industrial purse seine and pole and line fisheries.



Anchored FADs (AFAD)

- Anchored FADs can float at the surface or lie below the surface to avoid detection and hazards such as weather and ship traffic.
- They can be split into coastal and off-shore or archipelagic aFADs:
 - Coastal aFADs are primarily intended to improve the catch rates of subsistence and small-scale fishers.
 - Off-shore aFADs are used most extensively by industrial pole and line fisheries to target skipjack and other tuna species.



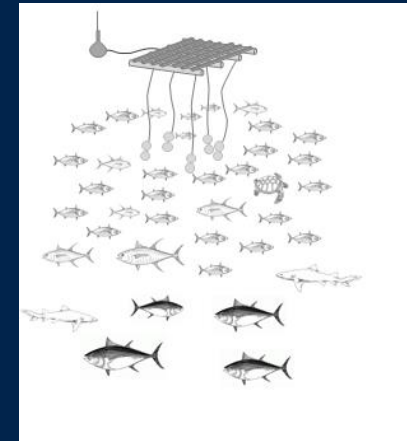


Drifting FADs (DFAD)

81,000-121,000 dFADs were deployed globally in 2013. In the Indian Ocean, where dFAD use has increased by 70% since the early 2000s, the number of annual dFAD deployments may now be between 10,500 and 14,500 (MRAG, 2017).



- Deployed in offshore oceanic waters.
- Used almost exclusively by industrial tuna purse seine fleets.
- Can float at the surface or lie below the surface to avoid detection and hazards such as weather.
- Low-cost construction, made from floating rafts of bamboo or plastic fitted with instrumented buoys containing satellite tracking devices and echosounders' for fish finding.
- Owned by the vessel that deploys them, although in practice a fisher will fish on any dFAD that is encountered.





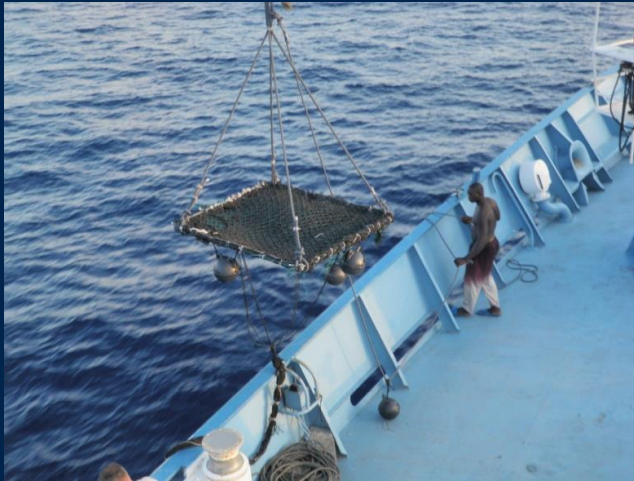
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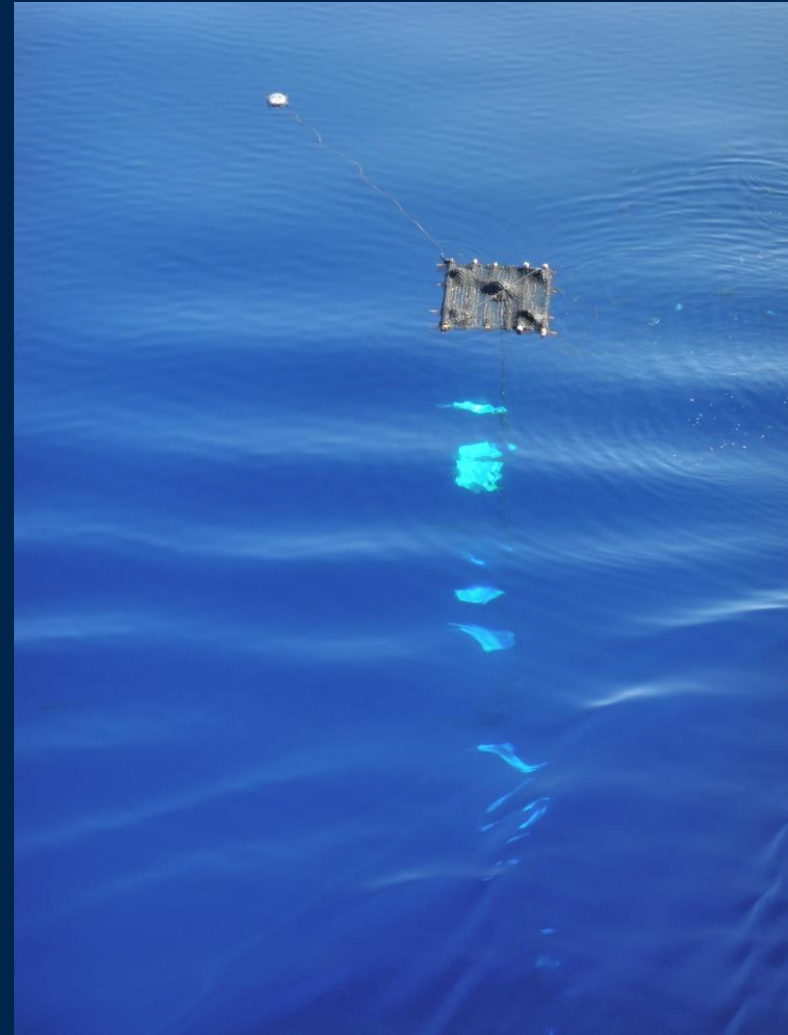
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Semi-merged FAD



Floating FAD



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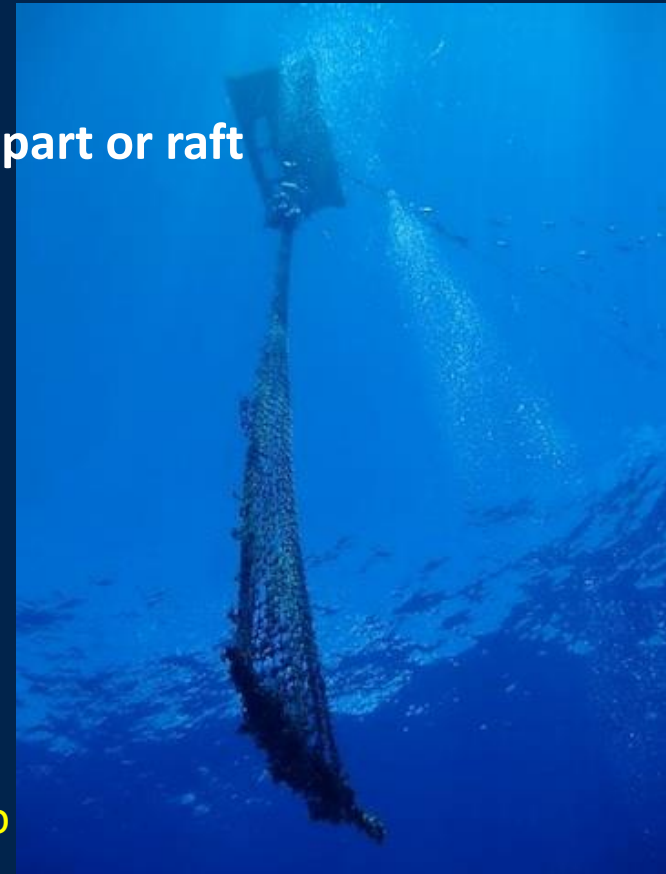
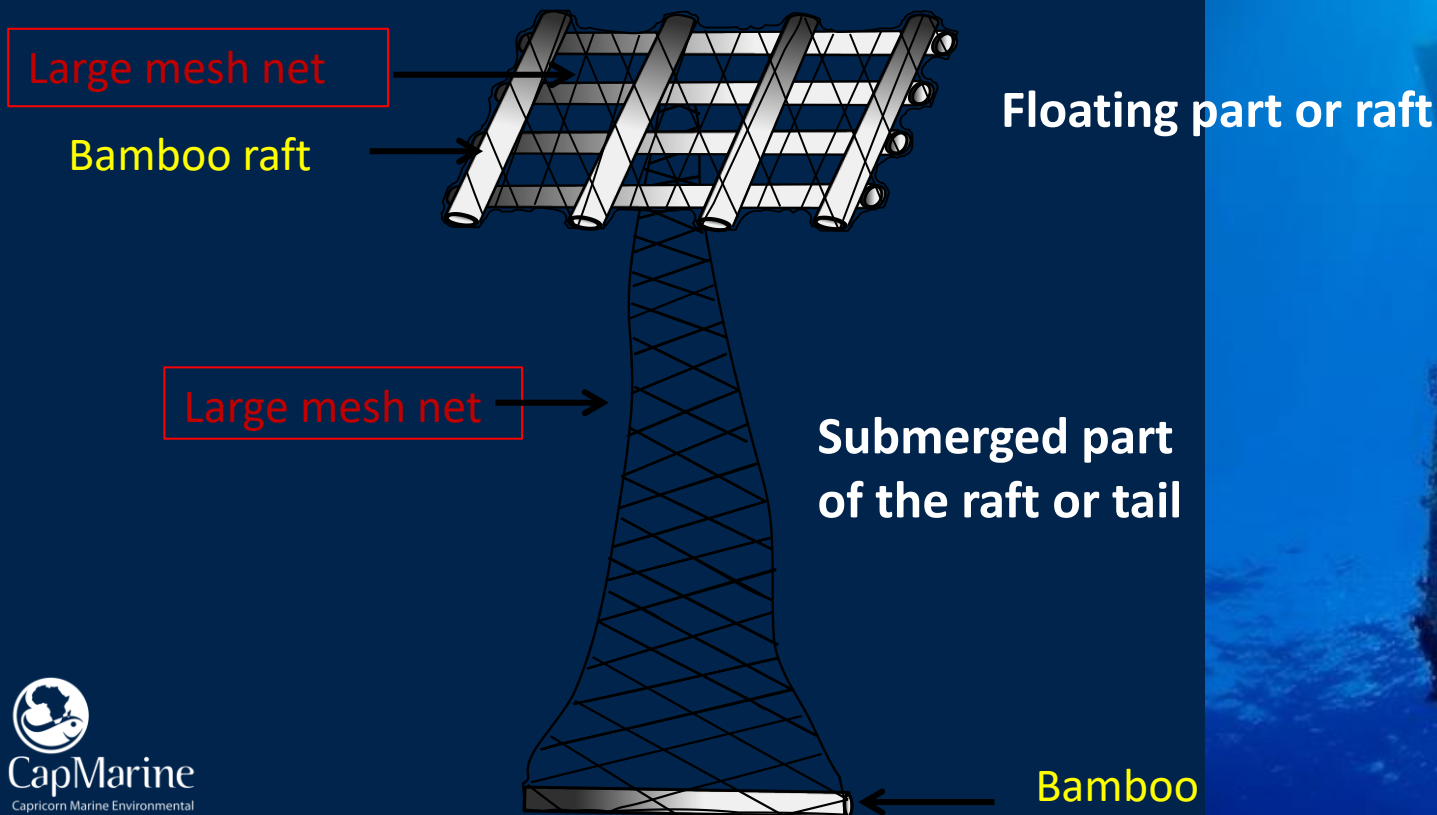
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Drifting FAD Structure

Most drifting artificial FADs have three main components: a floating structure, a submerged structure and a satellite buoy. The most sophisticated dFADs include sonar so that the fish population under the FAD can be estimated.





Raft

- ✓ usually made with bamboo canes laced together and/or other floating materials (e.g., cork floats or hermetically sealed PVC pipes).
- ✓ usually wrapped in a net to hold the components together, as well as to camouflage the FAD.
- ✓ often rectangular (from 4 to 6 square meters) but other forms are also used (e.g., cylindrical).

Tail

- ✓ underwater extension attached to the floating raft
- ✓ generally consists of a section of purse-seine net weighted at the base to remain almost vertical while the FAD drifts.
- ✓ The “tail” seems to have two uses:
 - attract fish; and
 - Slow FAD drift.
- ✓ can hang at depths ranging from a few meters below the surface to more than one hundred meters.





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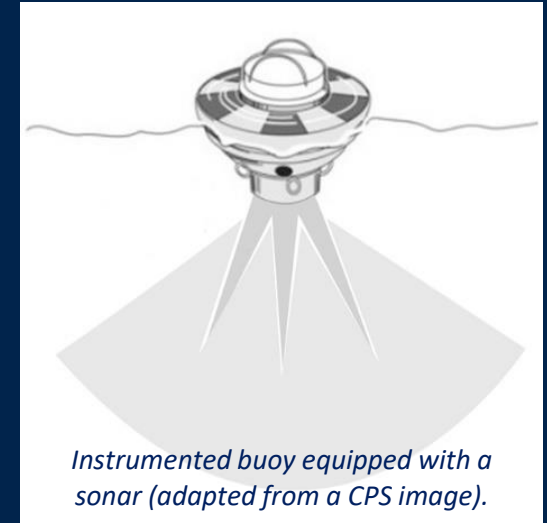
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Instrumented Buoys

- IOTC Res. 17/08 defines an instrumented buoy as a buoy with a clearly marked reference number allowing its identification and equipped with a satellite tracking system to monitor its position.

Notes:

- *IOTC Resolution 16/07 prohibits the deployment of FADs equipped with buoys fitted with artificial lights.*
- *When finding a FAD from another vessel, fishing vessels will replace its GPS buoy with a buoy of their own.*



Instrumented buoy equipped with a sonar (adapted from a CPS image).



Marked satellite buoy. Painted white codes are the identification codes added by buoy owner.



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- All tuna purse-seiners operating in the Indian Ocean are equipped with instrumented buoys and a reception system (INMARSAT or IRIDIUM).
- This receiver system displays the position and drift of the FADs, the temperature of the water under the FADs and buoys batteries condition.
- Some instrumented buoys are equipped with an echo sounder capable of transmitting data, which allows captains to check the quantities of fish near the FAD.



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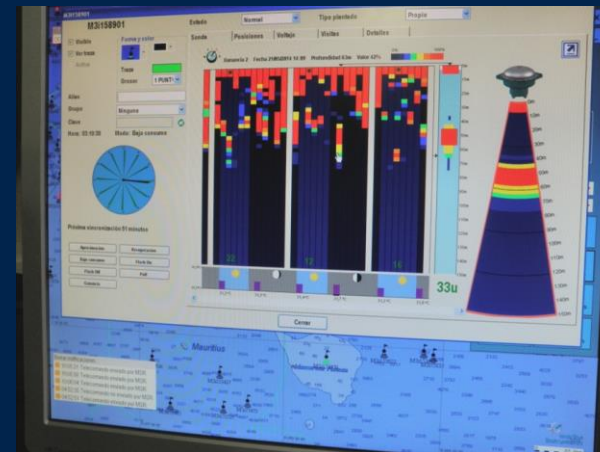
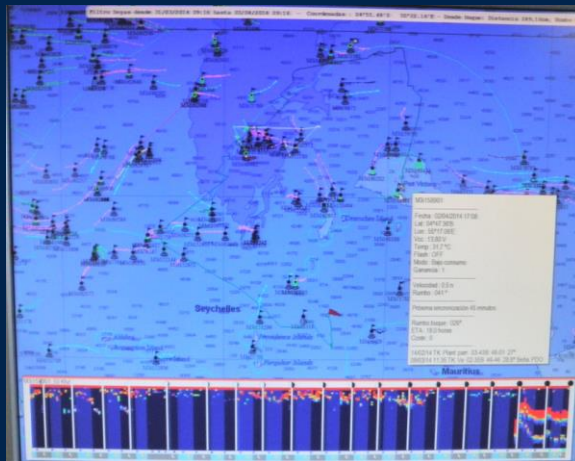
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Instrumented buoys and related electronic equipment

High-tech fishing



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Almost real-time knowledge of buoys positions and sounder profiles



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FADs and Observer Works

- 1. Observer's are to report on all aspects of FAD usage**
- 2. Observers are to collect information on the types and configurations of DFADs and AFADs used**
 - FAD markings**
 - Construction materials**
 - Design**
 - Entanglement incidents, etc.**



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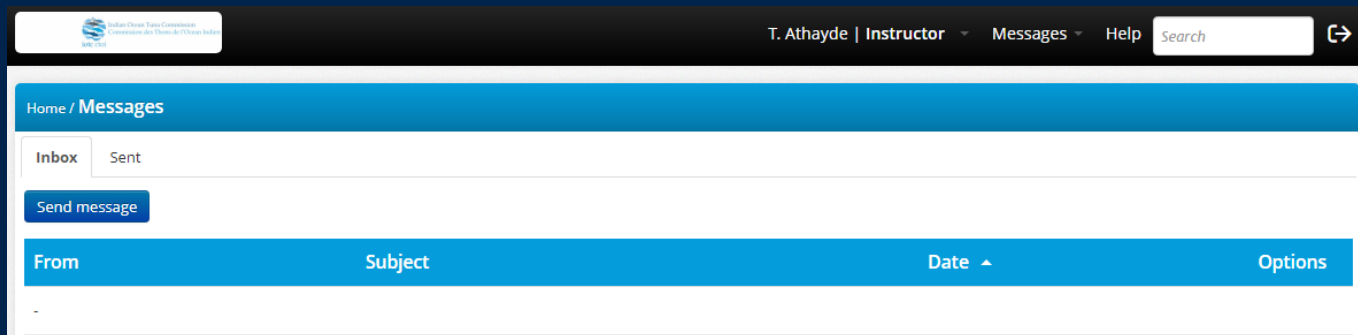


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ANY QUESTIONS?



send us a message via Talents LMS



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